Evaluation of Position Description

Labor Category/FLSA: Exempt

_____**Current Position Description**
__X__**Proposed Position Description**

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Approving Official: **Name:** Sheryl A. Wheeler **Signature:** S. A. W.
Title: HR Specialist

Position Title/Series/Grade: Mechanical Engineer, GS-830-12

ORGANIZATION: Division of Property Management

References: OPM PSC Mechanical Engineering, Series, GS-830

Introduction: This position provides mechanical engineering analysis of systems; long range planning for steam and condensate, chilled water, and compressed air production and distribution systems including analysis of fuel oil supply and storage and natural gas distribution systems. In addition, the employee provides consultation to other Branches, Sections, and Units and supports mechanical engineering tasks associated with these services and programs.

Series and Title Determination: This position functions as mechanical engineer and technical expert responsible for the coordination of multiple efforts to carry out the mechanical engineering program activities of the Division. The work requires knowledge of the principles of engineering and extensive experience to coordinate complex program projects. The position meets the criteria of the Mechanical Engineering Series, GS-830 which covers professional positions in the field of mechanical engineering, typically requiring the application of thermo-dynamics, mechanics, and other physical, mathematical, and engineering sciences to problems concerned with the production, transmission, measurement, and use of energy, especially heat and mechanical power. The title for positions in this series is Mechanical Engineer.

Grade Level Determination: The Mechanical Engineering Series, GS-830 is written in the Factor Evaluation System (FES) format under which factor levels and accompanying point values are assigned for each of the nine factors. For a position to warrant a given point value, it must fully meet the overall intent of the factor level description. If the position fails in any significant aspect to meet a particular factor level description, the point value for the next lower factor level must be assigned.

Factor 1, Knowledge Required by the Positions **Level 1-7 - 1250 points**
This factor measures the nature and extent of information or facts that a worker must understand to do acceptable work.

The incumbent uses knowledge of the principles, and practices of mechanical engineering to provide support in utilities production and to assess engineering practices and adapt techniques to solve a variety of engineering problems. In addition, the employee uses knowledge of a range of mechanical engineering to perform field investigations to resolve system and component problems and to specify testing requirements to ascertain system and component integrity and interpret the results of such tests. The incumbent applies analytical and problem solving methods and to techniques to identify program problems, draw conclusions, and develop recommendations to improve program operations. The employee applies the latest mechanical engineering developments in solving problems. This is comparable to Level 1-7.

According to the standard at Level 1-7 the employee uses professional knowledge applicable to a wide range of duties in a specialty area; ability to modify standard practices and adapt equipment or techniques to solve a variety of engineering problems; ability to adapt precedent or make significant departures from previous approaches to similar projects in order to provide for the specialized requirements of some projects; ability to apply the standard practices of related engineering disciplines as they relate to the specialty area.

The work is comparable to the following illustration under Level 1-7:
Knowledge and skills necessary to prepare designs and specifications for utility systems for multi-story office buildings, hospitals, etc.

Factor 2, Supervisory Controls: **Level 2-4-- 450 points**

This factor covers the nature and extent of direct or indirect control exercised by the supervisor, the employee's responsibility, and the review of completed work.

The supervisor provides overall requirements of assignments and assistance on controversial problems or matters of far-reaching impact. The employee and supervisor work together in developing priorities and timetables for work accomplishment. As the technical expert in the specialty, the employee independently carries out studies and renders advice to activities. Completed work is reviewed only to ensure effectiveness in administering assigned programs and in providing consultative services to activities. This is comparable to Level 2-4.

According to the standard at Level 2-4 the supervisor sets the overall objectives and resources available. The employee and supervisor, in consultation, develop the deadlines, projects and work to be done. The employee, having developed expertise in the specialty area is responsible for planning and carrying out the assignment; resolving most of the conflicts which arise; coordinating the work with others as necessary; and interpreting policy on own initiative in terms of established objectives. In some assignments, the employee also determines the approach to be taken and the methodology to be used. The employee keeps the supervisor informed of progress, potentially controversial matters, or far-reaching implications. Completed work is reviewed only from an overall standpoint in terms of feasibility, compatibility with other work, or effectiveness in meeting requirements or expected results.

Factor 3, Guidelines: **Level 3-4 --450 points**

This factor covers the nature of the guidelines and judgment needed to apply them.

The employee uses guidelines including national and local codes, standard professional materials, Federal laws and regulations, HHS, NIH, and ORS directives, and standard business and technical materials as well as handbooks, standard designs and guide specifications developed by the engineering staff and established practices. The employee exercises judgment and resourcefulness in modifying or extending traditional methods when precedents are not applicable. The employee is also responsible for development of instructions and explanatory material to supplement guidelines issued at the higher levels. This is comparable to Level 3-4.

According to the standard at Level 3-4 guidelines are often inadequate in dealing with the more complex or unusual problems. The engineer is required to use resourcefulness, initiative, and judgment based on experience to deviate from or extend traditional engineering methods and practices in developing solutions to problems where precedents are not applicable. This level may include responsibility for development of material to supplement and explain agency headquarters guidelines.

Factor 4, Complexity: **Level 4-5-- 325 points**

This factor covers the nature, number, variety, and intricacy of tasks, steps, processes, or methods in the work performed; the difficulty in identifying what needs to be done; and the difficulty and originality involved in performing the work.

The employee performs assignments that involve the full range of mechanical engineering activities associated with utilities production and distribution. Surveys and consultations with field activities require the ability to solve novel problems, to modify and extend standard techniques and to develop new approaches. The work requires the employee to provide authoritative advice and direction on a wide range of engineering programs. This is comparable to Level 4-5.

According to the standard Level 4-5 assignments are of such breadth, diversity and intensity that they involve many varied complex features. The work requires that engineers be especially versatile and innovative in adapting, modifying, or making compromises with standard guides and methods or originate new techniques or criteria. Assignments typically contain a combination of complex features which involve serious or difficult-to-resolve conflicts between engineering and management requirements.

Factor 5, Scope and Effect: **Level 5-4 225 points**

This factor measures the relationship between the nature of the work, i.e., the purpose, breadth, and depth of the assignment, and the effect of the work both within and outside the organization.

The employee provides engineering support in the design, improvement, maintenance and operation of mechanical utilities systems. Work efforts have a significant impact on the agency's utilities program. This matches Level 5-4 described in the standard.

According to the standard at Level 5-4 the purpose of the work is to provide expertise as a specialist in a particular specialty field by furnishing advisory, planning or reviewing services on specific problems, projects, programs and functions. This work may include the development of criteria, procedures or instructions for major agency activities. Work products impact on a wide range of the agency's engineering program.

Factor 6 Personal Contacts
and Factor 7, Purpose of Contacts **Level 3C 180 points**

These factors include face-to-face and telephone contacts with persons not in the supervisory chain. Only those contacts that have a demonstrable impact on the difficulty and responsibility of the work performed are credited. The two factors are arranged in a matrix, with the total points credited based on the combination of the levels assigned.

The incumbent has personal contacts with other engineers in the agency, utility companies and municipalities, and technical professional organizations. Contacts are for the purpose of exchanging information, coordinating work efforts, discussing equipment requirements, and resolving questions or problems of field personnel. Some contacts require the employee to influence or convince other engineers to adopt approaches about which they may be skeptical. This is comparable to Level 6-3 and 7-3 described in the standards

At Level 6-3 personal contacts include a variety of officials, managers, professionals or executives of other agencies and outside organizations. Typical of these contacts are manufacturers' representatives, private architect-engineer firms, specialists at contractors' plants and engineers and architects from other Federal agencies. At Level 7-3 the purpose is to influence or persuade other engineers to adopt technical points and methods about which there are conflicts, to negotiate agreements with agencies and contractors where there are conflicting interests and opinions, or to justify the feasibility and desirability of work proposals to top agency officials.

Factor 8, Physical Demands **Level 8-1 5 points**
The work is mostly sedentary, although there is some walking, bending and climbing associated with on-site inspections.

Factor 9, Work Environment **Level 9-1 5 points**
Most work is performed in an office setting, but there is some exposure to conditions in facilities under inspection, construction, or repair.

TOTAL POINTS **2890**
This falls within the GS-12 point range (2755-3150).

Final Classification Determination: Mechanical Engineer, GS-830-12.

POSITION DESCRIPTION

Mechanical Engineer, GS-830-12
Division of Property Management

Introduction:

The Division of Property Management (DPM) serves all of the NIH Community by providing support for renovations, new construction and maintenance of existing facilities, utilities and grounds. The Division provides professional leadership for the engineering programs of the National Institutes of Health (NIH). The scope of DPM operations is such that the effectiveness with which they are carried out has a major and direct effect on the worldwide biomedical research programs of the NIH. In addition to the main facilities at the Bethesda Campus and in Poolesville, MD, NIH has facilities at Research Triangle Park, North Carolina, Rocky Mountain Laboratory in Montana and the Gerontology Research Center in Baltimore, MD.

This position is organizationally located within the DPM in one or more of the subordinate organizational components responsible for the provision of operations and maintenance of NIH facilities. The position requires the incumbent to be flexible in the types and complexity of work performed. The position requires that the incumbent be able to work independently and take the initiative to complete the work assigned with a minimum of direct supervision regardless of the nature of the work.

The Central Utilities is responsible for management of the utility services program at NIH. This includes the operation and maintenance of the central boiler plant, central air conditioning plant, and all underground utility distribution and collection systems. Other related functions include environmental compliance, energy and water management, utility budgeting, metering of utility consumption, planning for utility system expansion, and permitting of new connections and alterations to the utility systems.

The facility and utility operations and maintenance program is complicated, and critical elements are intensified by aging equipment and buildings, rapidly expanding and changing utility requirements, aging support infrastructure, unpredictable purchased utility prices, rapidly changing legislation and federally mandated programs and to a large extent by the complexity of the various missions being supported.

The duties of this position are to provide mechanical engineering analysis of systems; long range planning relating to steam and condensate, chilled water, and compressed air production and distribution systems. Also, the analyses may include fuel oil supply and storage and natural gas distribution systems. Furthermore, provide consultation to other organizations and perform mechanical engineering tasks associated with these services and programs. These tasks require professional competence and experience and a minimum of routine supporting tasks. The position is primarily concerned with engineering problems associated with steam and chilled water production and distribution systems and technical and management support to boiler and chiller plant operation and maintenance group. The engineer must concern himself with conventional mechanical equipment, apparatus and systems.

Major Duties and Responsibilities
The major duties and responsibilities are:

A: Engineering Consultation and problem Resolution (20%)
Providing mechanical engineering consultation and analysis. This requires the application of knowledge and experience in the solution of mechanical engineering problems. Also, responds to requests relative to specific and immediate central boiler, compressed air and chilled water plant and distribution systems and natural gas distribution system, which may relate to a production or distribution system and/or component failure. The incumbent assures that the latest state-of-the-art applications are applied to avoid future operational problems.

B: Long Range Utility Planning (20%)
Formulates long-range plans for the development and operation of mechanical plants and distribution systems (Master Utility Plan) to assure that the overall development of the various production and distribution systems will meet the long range mission requirements of NIH, as defined by the Master Facility Plan. Such mechanical master utility plans will be based on analyses of existing steam, chilled water, compressed air and natural gas distribution loads, project loading growth, existing system configuration, required reliability and state-of-the- art equipment, technology, operation and management to assure systems for given reliability requirements. Also, to ensure knowledge is properly documented, steam/condensate, chilled water, natural gas, and compressed air utility drawings and databases will be developed and maintained.

C: System Analyses and Technical Adequacy (20%)
Performing field studies and engineering analyses on steam, chilled water, natural gas, and compressed air distribution systems and components to assure they continue to meet the minimum requirements to assure system integrity. Conduct computer modeling and simulations to analyze the compressed air distribution system, steam and chilled water plants and distribution systems, and to assure that the system and components are operating within their designed constraints. Perform analyses on the mechanical production and distribution systems to ensure that the systems and components operate at the most efficient and reliable production levels. Perform engineering analyses to assure the most efficient and economical utility delivery (component & systems). Also, writes correspondence and contract documentation to explain, provide directions, and to procure and resolve equipment and system problems. Also, assists in the technical development and implementation of a utility metering program with emphasis on steam, chilled water, natural gas, and compressed air utilities.

D. Develop and maintain Preventive Maintenance and Repair and Improvement
(R & I) Programs (10%)
Analyzes mechanical production and distribution systems, reviews all the related literature and documentation, and develop and update comprehensive preventative maintenance programs covering all pertinent production and distribution system components. Performs periodic analyses, inspections, and reviews of production and distribution systems to identify system deficiencies relative to capacity, flexibility, component condition, reliability, efficiency, operation, maintenance and safety. Evaluates deficiencies, develops solutions to correct

deficiencies, compares alternative solutions on a technical and economic basis, and develops comprehensive R&I Program requirements to correct deficiencies. Such corrections should be established in coordination with other organizations to maximize system reliability while minimizing internal and external utility rates.

E: Project Plans and Specification Review and Coordination (10%)
Review projects for impact upon the adequacy of production and distribution systems, adequacy of planning of interface with distribution systems, and adequacy of energy conservation considerations. Assure the adequacy of mechanical utility system planning to accommodate the load increases associated with the planned projects.

Provides guidance, data and information on a continuing basis for use in designs and specifications that involve production and distribution systems. Reviews plans and specifications, which impact production and distribution systems to assure compliance with the required mechanical system development and operation. Provides specific and detailed requirements (characteristics, capacity, rating, protective equipment, etc.) for interconnections between mechanical utility systems and the facility systems. Provides construction support and technical assistance on mechanical utility projects.

F: Procured Utility Service Analysis and Support (5%)
Provide the required technical support as follows:

Determine and verify the specific technical parameters required for each utility service procurement action.

Analyze the ability of the utility supplier to provide the present and future natural gas service requirements and the inherent reliability of the utility supplier's plants, transmission, and distribution system.

Perform cost and benefit analyses relative to economic and technical parameters of the different means by which the utility supplier could provide the natural gas service.

Analyze the interface requirements for natural gas service from the utility supplier to assure compatibility with the NIH facilities.

G: Energy Conservation Customer Support (5%)
Assist in conducting surveys and minor studies of the production and distribution and utilization systems for the sole objective of conserving energy, or as part of a larger study and analysis of the overall efficiency of production and distribution systems and components. Evaluate inefficiencies, develop operating and management procedures for the more effective utilization of energy, and develop projects to modify production and distribution systems and utilization systems in order to increase the efficiency of these systems.

H: Perform Utility System Testing and Field Investigation (10%)
Develop, establish and execute specific programs of testing of production and distribution and utilization system components in order to ascertain their mechanical integrity. Analyze and

evaluate the results of such a testing program and recommend specific actions based on test analyses. Perform field investigations, including testing, to determine causes of load, pressure fluctuations, or to determine the cause of the failure of a mechanical system or component. Analyzes deficiencies and develops optimum solutions to correct the deficiencies. Develop and implement (in coordination with the central plant and distribution personnel and the use of state-of-the-art Supervisory Control and Data Acquisition (SCADA)) technology and administrative systems to monitoring, track and control production and distribution systems.

Factor 1, Knowledge Required By The Position

Knowledge of mechanical engineering principles and theory of the type, scope and thoroughness ordinarily acquired through completion of a four-year engineering curriculum in an accredited university leading to a bachelor degree in mechanical engineering, and a minimum of four (4) years of professional experience in the discipline.

Knowledge of, and experience in the production and distribution and utilization of steam and chilled water, and the distribution of natural gas, and compressed air. Incumbent must have a strong knowledge of the design, operations and maintenance, inspection and testing, and analysis of central heating and cooling plants and distribution systems.

Knowledge and ability to perform fluid flow analyses, load flow, heat balance and loss, life cycle cost, water treatment, plant performance studies and analyses using state-of-the-art computer modeling and simulations software, e.g., KY-PIPE, E20-II, etc.

Knowledge and ability to perform field investigations to resolve system and component problems. Must also have the knowledge and ability to specify testing requirements to ascertain system and component integrity and interpret the results of such tests.

Knowledge of the NIH's planning process in order to be effective in preparing master utility plans for production and distribution system.

Knowledge of the Federal and/or NIH policies, instructions and regulations applicable to the operation and maintenance of production and distribution systems. Incumbent shall also have knowledge of the National Codes applicable to the design, construction, operation, maintenance, inspection, and testing of heating and cooling plants and distribution systems and components.

Knowledge of existing practices, theories, techniques, and methodology to identify solutions to relevant problems, especially in the areas of utility system and component reliability and failure analysis, energy conservation, utility systems analyses, utility procurement technical assistance, management data analysis, customer liaison, etc.

Knowledge of utilities systems operations, particularly Public Works utility systems. Must have knowledge of the commercial utility operations and the regulatory environment that they must operate.

Knowledge and ability to employ tact in dealing directly with all levels of professional and nonprofessional personnel within the different organizations.

Ability to interpret Federal, ORS, and higher level NIH policies and regulations, to evaluate the impact they have on activities supported, and to provide appropriate program guidance and assistance.

Ability to incorporate state-of-the-art engineering and scientific concepts into assigned program policies and procedures.

Factor 2, Supervisory Controls

The position is under the general-supervision of the GS-801-13, Supervisory General Engineer. The supervisor sets objectives and allocates resources for work assignments. The incumbent develops the schedules and methodologies under which the work will be accomplished, for review and acceptance by the supervisor. The incumbent is responsible for the execution of the various assigned projects, programs within the allocated resources, and agreed to time schedules. The results of the work assignments are considered as technically accurate and conclusions and/or recommendations are normally accepted without significant change. Reviews are concentrated on such matters as fulfillment of program objectives, adherence to administrative policy, and assurance that broad technical objectives have been met. Whenever necessary, the incumbent coordinates assignments with others to assure policy is maintained.

Factor 3, Guidelines

Guidelines include national and local codes and standard professional material, federal and state laws and regulations, directives, local instructions, budget guidance, standard business references, economic indices and labor rates, federal and commercial catalogues. Due to the requirements, guidelines may not apply directly and require a degree of interpretation to determine the extent of relevance to each type of problem encountered. The incumbent is to use resourcefulness, judgment, and experience to identify methodologies for solving problems which may be outside traditional engineering standards or practices. The incumbent is to prepare guidelines and methodologies to effectively execute the various assigned utility engineering programs. The incumbent researches and utilizes practices and policies, engineering design manuals, guidelines, polices and practices of other Federal agencies, engineering textbooks, and pertinent professional organizations and industry standards.

Factor 4, Complexity

The work involves long range planning relative to the forecasting of steam, chilled water, natural gas, and compressed air utility demand and/or energy production requirements, analyzing and programming for production and distribution system configurations to meet reliability requirements, analyzing and programming for system efficiency, etc.

The work involves distribution systems, which have evolved over extended periods. This result in the need to resolve equipment and systems problems associated with different types and makes of equipment and with obsolete and state-of-the-art technology. The work requires the use

of state-of-the-art computer modeling and simulation software and hardware to effectively analyze utility systems and components capabilities, their reactions under adverse conditions or planned changes, and determine the proper operational constraints, parameters, and settings. The decisions at all phases requires: analysis of alternatives, consideration of technical advances, evaluation of technical and program needs and time constraints, determination and analysis of cost, impact upon other budget and planning actions, and long range impact upon resource managers and customers.

Factor 5, Scope and Effect

The purpose of the work is to provide mechanical engineering support to the operational personnel in order to maximize the efficiency and effectiveness of the utility plants and distribution systems, while minimizing the energy costs. Engineering consultation, inspection, analysis, testing, review and monitoring programs will be implemented to meet these objectives. Incumbent will be point of contact for mechanical engineering information, actions, and policy.

Factor 6, Personal Contacts

In the execution of the incumbent's programs and assignments, he or she must communicate with different NIH organizations. Such communications includes engineering, operational and maintenance, and management personnel. Also, communicates with the technical levels of personnel within utility companies and municipalities, technical professional organizations, pertinent levels at NIH and parallel organizations within other federal agencies. These contacts are made through personal visits, briefings, meetings, conferences, telephone conversations, and written correspondence.

Factor 7, Purpose of Contacts

Contacts are to determine problem areas and resolution of problems; provide effective customer liaison; maintaining customer satisfaction; gather data during technical, operational studies, analyses, inspections, assessments, monitoring processes, and in response to specific problems or future planning; coordinate and negotiate commercial utility service and define service limitations and opportunities, with commercial suppliers and other Federal agencies; coordinate with management and employees the implementations of new methods, work procedures, requiring changes in established operational and business procedures, etc; consult with technical and engineering, operational personnel, management personnel to exchange information associated with common engineering, operations, and management programs (existing or potential problems, opportunities, etc.); update managers on progress of utility operation and maintenance projects; and obtain information from commercial companies or vendors regarding developmental methodologies, specialty skills, specialty equipment, automated systems, training, or resource assistance.

Factor 8, Physical Demands

The work is primarily sedentary; how ver, there may be some climbing, walking, bending, etc. involved in inspecting, evaluating, an assessing utility facilities during pre-construction, construction, and post construction ac vities

Factor 9, Work Environment

The work is normally performed in a office setting where there is adequate heating, lighting and ventilation. However during field vis s, the incumbent is exposed to production and distribution systems and structures that involve m derate risk. He or she is also sometimes exposed to adverse weather conditions during suc 1 field visits.